

USAWC STRATEGY RESEARCH PROJECT

AN ASSESSMENT OF OUR NATIONAL INFRASTRUCTURE STRATEGY

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ABSTRACT

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Our nation's physical infrastructure includes a variety of complex and interrelated systems that are critical components in providing for our quality of life and economic security. It includes the following sectors: aviation, roads and bridges, dams, drinking and waste water, energy, hazardous and solid waste, navigable waterways, public parks and recreation, rail, schools, security, and transit. There are many challenges with this infrastructure. To illustrate, the American Society of Civil Engineers recently graded the overall condition of our infrastructure as a "D." This indicates a drop from a "D+" four years ago. The estimated cost to repair and upgrade our infrastructure is over a trillion dollars. Given the many demands for federal resources, an effective national infrastructure strategy is essential. Ideally, this strategy would facilitate the funding of our most critical infrastructure requirements in an integrated fashion. The purpose of this paper is to evaluate our existing national infrastructure strategy. It will also offer recommended improvements based upon the recent experiences of the United States Army Corps of Engineers and the Department of Transportation within their respective sectors.

AN ASSESSMENT OF OUR NATIONAL INFRASTRUCTURE STRATEGY

The president of the American Society of Civil Engineers (ASCE) offered the following assessment of our nation's infrastructure: "If we treated our own homes like we treat our infrastructure, we'd all live in shacks."¹ ASCE recently graded the condition of our infrastructure as a "D;" this indicates a drop from a "D+" four years ago.² The nation's physical infrastructure includes a variety of complex and interrelated systems that are critical components in providing for our quality of life and economic security. These systems can be described using the following sectors: aviation, roads and bridges, dams, drinking and waste water, energy, hazardous and solid waste, navigable waterways, public parks and recreation, rail, schools, security, and transit.³ Americans use this infrastructure daily, and it directly contributes to our quality of life. Our infrastructure also plays an essential role in our economy. To illustrate, transportation-related goods and services alone contributed \$980 billion to a \$9.3 trillion U.S. Gross Domestic Product in 1999.⁴ Our infrastructure (ports, airfields, roadways, etc.) is also required to effectively project our military forces overseas. Fortunately, this infrastructure usually works as intended, but there are symptoms of a larger problem that appear to validate ASCE's assessment: increasing congestion on the highways, crowded schools in many areas, increasing examples of catastrophic failure (e.g., the northeast power failure of 2003), and significant estimated costs to repair this infrastructure, \$1.6 trillion over 5 years.⁵ The \$1.6 trillion estimate does not include the funding required to protect our infrastructure. The tragic events of 11 September 2001 illustrated the criticality of this component of an infrastructure strategy. Additionally, a lack of adequate funding for maintenance and repair could produce effects similar to a terrorist attack (i.e., if a dam or bridge fails due to a lack of maintenance, the effects would likely be equally catastrophic).

Given the critical role that our infrastructure plays in providing for our economic and national security and our quality of life, an effective national infrastructure strategy is essential. Furthermore, when considering the many demands for federal resources and the key role the federal government plays in providing infrastructure, an integrated federal strategy is especially critical. Ideally, a national infrastructure strategy would effectively articulate and balance ends, ways, means, and risk, facilitating the funding of our most critical infrastructure requirements in an integrated fashion. The purpose of this paper is to evaluate our existing national infrastructure strategy and offer recommendations for improvements of the federal role in developing and sustaining physical infrastructure. The recommended improvements will be

based largely upon the experiences of the U.S. Army Corps of Engineers (USACE) and the U.S. Department of Transportation (DOT) within their respective sectors.

Our Current Infrastructure Strategy

For the purpose of this paper and unless otherwise specified, “infrastructure” is used very broadly, and it will include the sectors noted above (i.e., aviation, roads and bridges, dams, etc.). Federal, state, and local governments and the private sector all have key roles in developing and sustaining this infrastructure:

Responsibility for these valuable assets is primarily a local matter, with some 80 percent of the annual investment in infrastructure coming from local and state government sources or private enterprise. Nevertheless the federal government’s influence on infrastructure development and management is substantial, exercised through many programs that provide funds for purchasing and construction, set standards, and otherwise seek to ensure the safety and efficacy of various parts of the nation’s infrastructure.⁶

While infrastructure is defined broadly herein, the focus of this paper is on the federal role in public infrastructure. The federal role will include the following broad ways of providing for infrastructure: construction and capital acquisition, maintenance and repair, operation, and protection. The scope of the federal government’s investment in infrastructure is large: an average of \$150 billion (in constant 2000 dollars) has been spent annually since the early 1980s; spending has been trending downward from approximately 1987 to 1998.⁷

Given the focus on and scope of the federal role, it is important to note the responsibilities for infrastructure are shared between the executive and legislative branches, and there are numerous agencies, offices, and committees involved.⁸ In the executive branch, there are five federal agencies directly involved: USACE, DOT, the Environmental Protection Agency, the Department of Energy, and the Department of Homeland Security (for the protection component). In the legislative branch, there are several House and Senate Committees that play critical roles in resourcing the various sectors of infrastructure. In the Senate, these committees include: Environment and Public Works; Energy and Natural Resources; Commerce, Science, and Transportation; Banking, Housing and Urban Affairs; and Homeland Security and Governmental Affairs. In the House, they include: Transportation and Infrastructure; Energy and Commerce; and Homeland Security. The Government Accountability Office (GAO) and the National Academies are also involved in studying infrastructure issues.

In theory, our existing national infrastructure strategy should integrate the efforts of the federal agencies developing and sustaining our infrastructure. In 1995, a National Academy of Sciences study offered the following assessment of our strategy: “There currently is no integrated federal policy toward infrastructure as a whole.”⁹ It appears that not much has changed since that report was published. Specifically, there is not an integrated national strategy that articulates overarching ends (U.S. policy objectives), ways (the concepts and methods used to accomplish those objectives), and means (resources) across the various sectors of infrastructure. Most critically, the lack of a long-term vision and well-defined ends and goals leads to a very fragmented approach and the sub-optimal use of federal resources. While the referenced agencies have published strategies that generally articulate ends, ways, and means within their respective sectors, there is a significant lack of integration and synchronization across the sectors. The above are fundamental, “root cause” weaknesses with our existing approach that lead to systemic inefficiencies, increased and unnecessary risk, and important second and third order effects.

For example, one of these effects is that we are unable to objectively assess the scope of the problem or the level of risk we are willing to accept. While ASCE’s efforts to track the condition of our infrastructure with their recurring “report card” are commendable, one could argue that ASCE has a vested interest in depicting the condition of our infrastructure in unfavorable terms. The federal agencies involved in providing infrastructure produce detailed descriptions of the condition of their infrastructure; however, there is a surprising shortage of independent government assessments and validation of various estimates regarding our nation’s infrastructure. A 2001 GAO report illustrates this. The report addressed the federal government’s role in ensuring a sound public infrastructure and reviewed the estimates of investment requirements of several federal agencies. One of the report’s key conclusions is revealing:

First, the investment assessments...cannot be easily compared or simply “added up” to produce a national investment of all infrastructure investment needs because they were developed using different methods and were for different time periods....each estimate had limitations associated with the quality of the data used in developing it.¹⁰

This indicates that we do not have a consistently derived, reliable estimate of the scope of the problem at the federal level. Without this, we face a fundamental challenge in developing and effectively balancing ends, ways, means, and risk across the sectors in an integrated fashion.

While priorities are determined within the separate sectors, the current approach lacks a deliberate means to identify the relative priorities across the various programs (i.e., among

roads, aviation, water, inland navigation, etc.). Additionally, there is not a method for synchronizing the efforts between the very broad means of providing for a robust infrastructure (i.e., construction and capital acquisition, maintenance and repair, operation) and protection. Given the many demands for federal resources, effective prioritization is critical. Priorities are ultimately related to ends, and without overarching national ends, we will continue to struggle with prioritization across the sectors. This ultimately creates an unknown and unacceptable level of risk.

A recent study offered perspective on the current approach: “Neither the federal government nor most state governments coordinate infrastructure spending or planning across their agencies.”¹¹ Dr. Sue McNeil, a professor of civil and environmental engineering who has extensively studied these issues and is recognized for her expertise on them, summarizes our approach: “no one in the US is looking at how we could best deliver services. Instead, everyone is most interested in his or her own turf.”¹² This is often more caustically referred to as a “pork-barrel” approach. Critics of the current process highlighted a controversial bridge project in Alaska as an example of this. In a recent transportation bill, \$223 million in “earmarked” funds were included for proposed bridging in Alaska that has been described as a “Bridge to Nowhere” and as an “abomination” by Taxpayers for Common Sense.¹³ While this project may not actually be executed (largely due to intense public criticism), it clearly illustrates the potential sub-optimal allocation of resources and a fragmented approach. The current process, and the budget process specifically, generates a short-term, means-driven approach. Given the competing demands for our limited federal resources, this approach is not acceptable and can ultimately lead to higher priority needs not being addressed.

While the federal agencies involved in providing infrastructure do not appear to be guided by an overarching strategy that would integrate their actions across the infrastructure sectors, there are existing mandates designed to improve efficiency and performance within their sectors. These mandates include the 1993 Government Performance and Results Act (GPRA) and the President’s Management Agenda (PMA). GPRA “requires the development of periodic strategic and annual performance plans and reports. This is part of a broader movement towards greater accountability in government and greater responsibility for results....”¹⁴ The PMA, and specifically, the Office of Management and Budget’s (OMB) Program Assessment Rating Tool (PART) “has been designed to use performance information more explicitly in the federal budget formulation process by summarizing performance and evaluation information.”¹⁵ Efforts to link resources to results are often referred to as performance based budgeting. These initiatives are strengths of the current process and are contributing to better utilization of

resources; they should be continued. Again, while they are effective at promoting efficiency and effectiveness within the various agencies and their respective infrastructure sectors, they do not address the larger integrating deficit.

Some would argue that our system of government with its division of power between the legislative and executive branches leads to many of the issues described above (and especially to allegations of “pork-barrel” spending). While the division of power in our federal government creates complexity, it is not insurmountable. Also, certain ongoing systemic improvements made by various federal infrastructure providers within their sectors can be exported and applied across the sectors to ultimately improve our national strategy.

The Evolution of the USACE Civil Works Process

As indicated above, several federal agencies have a key role in developing and sustaining our national infrastructure. In its Civil Works program, USACE plans, constructs, maintains and operates a variety of water-related infrastructure and facilities. USACE’s primary Civil Works missions include providing for inland navigation, flood control, and environmental restoration. It is important to note that these missions sometimes involve competing interests. For example, large inland navigation and flood control projects can have significant environmental consequences. Additionally, there are typically many competing demands for water resources. To illustrate, consider the challenges associated with maintaining the optimal storage level in a given reservoir system. Upstream users generally prefer relatively high reservoir levels for maximizing hydropower, upstream water supply, and recreation. This is contrasted with downstream users’ demands for water supply, navigation, and environmental considerations.

These challenges are exacerbated during periods of drought. The recent multi-year drought on the Missouri River illustrated this. During this drought, reduced snowfall in the Missouri River headwaters has resulted in steadily decreasing upstream reservoir levels. The decreased water levels have curbed recreation, reduced hydropower generation, and restricted downstream water releases and the associated commercial navigation capacity. In addition, the reduced downstream flows may be adversely affecting an endangered fish, the pallid sturgeon.

The most recent evolution of USACE’s Civil Works program addresses these challenges and others, and it is summarized in the 2004 Civil Works Strategic Plan. Most critically, and fundamentally, this plan provides an integrated, overarching strategy that articulates ends, ways, and means. This approach also contributes to more informed decision making. The Civil Works Strategic Plan outlines broad or “grand” objectives including the following:

The development and management of a safe and reliable world-class maritime transportation system...provid[ing] water resources solutions and infrastructure to save lives and reduce property damage from floods and hurricanes...[and the] restor[ation], protect[ion], and repair [of] the environment to maintain the viability of our ecosystems.¹⁶

The plan then further defines goals and nested or supporting objectives. These goals and objectives provide essential direction as USACE attempts to effectively balance various demands on a given project; they also provide a framework to facilitate prioritization. The articulation of overarching and supporting objectives is a critical first step in an effective infrastructure strategy; the USACE Civil Works Strategic Plan does this well.

The plan next outlines a variety of broad methods or ways to best achieve the desired ends. These methods are especially vital as they emphasize an integrated, synchronized approach to addressing water resources infrastructure challenges. To illustrate, the plan stresses all of the following methods:

a holistic focus on water problems and opportunities; a systems approach for analyzing water problems and solutions; attention to the watershed as a logical geographic area for managing water resources; and collaboration, partnerships, and teamwork for deriving and implementing solutions.¹⁷

These methods are critical elements in allowing USACE to effectively consider and balance competing demands and identify infrastructure solutions that provide maximum benefit for the nation. Consider, for example, USACE's "watershed" or regional approach. This approach emphasizes the need to evaluate projects in the "context of the broad range of needs in the watershed [or larger region]...so that conscious decisions are made about tradeoffs and opportunities for synergies...."¹⁸ The watershed approach provides an effective framework to balance local, regional (basin-wide), and federal interests; it also effectively identifies any competing pro-development and environmental interests.

This is coupled with a systems approach which views infrastructure as a collection of interrelated components designed to perform certain functions. As compared to a specific project focus, this broader systems methodology helps predict how changes in one or more parts of the system (or watershed) affect the other parts of the system. For example, flood protection improvements such as levees in upstream areas of a watershed can increase downstream flow rates and lead to second and third order effects such as decreased sedimentation and environmental consequences. The systems approach and watershed framework facilitates an "evaluation of a range of project options simultaneously to determine the best combination of projects to achieve multiple goals over the entire watershed rather than

examining each potential project in isolation from others.”¹⁹ In short, a systems approach is a means to maximize benefits across the watershed or region.

Another key USACE method is a collaborative approach that stresses partnerships and teamwork for deriving and implementing solutions.²⁰ Given the complexity of the issues and the competing demands associated with water infrastructure, this is a critical component of an effective strategy. There are typically a variety of agencies and organizations involved on a given water resources infrastructure project. Interagency coordination and cooperation is critical to ensure effective planning and execution of water resources projects. It is also important to note the Civil Works strategy was developed in a collaborative fashion in which major input from key partners and stakeholders was considered and incorporated as appropriate. This will also lead to improved strategy and project execution.

While the USACE strategy stresses the use of collaborative planning and execution, there are larger interagency and intergovernmental policy issues that remain unresolved. Specifically, this includes conflicting aspects of water policy. A 2004 National Academies report highlighted this: “The administration and Congress should rectify inconsistent legislation and set priorities, promote coordination across agencies, and provide leadership in revising federal guidance for the Corps.”²¹ In this case, a national oversight or integrating function could address and resolve these issues to provide for more coordinated planning and execution.

The USACE infrastructure planning process is also effective at determining whether a federal interest is at stake in a given proposal for federally funded infrastructure. The USACE planning process includes two key phases: reconnaissance and feasibility. The purpose of the reconnaissance phase (approximately one year in duration) is to determine whether or not a federal interest is at stake in a given proposal for federally supported water resources infrastructure. The large majority of reconnaissance studies (approximately six of seven) conclude that a federal interest in a proposed water resources project does not exist.²² This process is very effective at screening projects to ensure that a legitimate federal interest exists. If a significant federal interest is identified in the reconnaissance study, the proposal then enters the feasibility phase. During this second phase which typically takes between three to five years to complete, significant collaboration and coordination occurs. While some criticize the length of this process, the phased approach effectively achieves two important purposes: determining whether or not a federal interest is involved and, if so, then subsequently facilitating collaboration and public involvement in the infrastructure planning phase. This will ultimately result in improved execution.

USACE also has a means by which some proposed projects are independently reviewed before they are recommended to Congress. The purpose of independent review is to ensure that a proposed expenditure of federal infrastructure funds will “demonstrate a solution to a public need, meets the [f]ederal interest, has a willing and capable non-federal sponsor, has its benefits outweigh the costs, and it is in compliance with all environmental laws and policies.”²³ A “capable non-federal sponsor” infers that some non-federal matching requirements and resources are required; this promotes the more effective use of federal monies. The process of independent review is especially useful on proposed infrastructure involving relatively large expenditures of funds. For example, independent review was recently used effectively on proposed improvements on the Upper Mississippi River and Illinois Waterway.²⁴

USACE is also using performance based budgeting to more effectively link resources to desired outcomes. This method was used during the FY06 budget submission, and the Assistant Secretary of the Army for Civil Works highlighted it in the following:

The [FY06 Civil Works] budget provides funding for the planning, design, and construction of those projects with the highest expected returns in the Corps’ primary mission areas of commercial navigation, flood and storm damage reduction, and aquatic ecosystem restoration.²⁵

These efforts should continue. Among other benefits, they minimize the likelihood of “politically-focused” infrastructure funding.

All of these ways are ultimately intended to facilitate the accomplishment of the overarching ends specified in the strategy. They also contribute to informed decision making by effectively articulating the implications and tradeoffs of various policy decisions. For example, it is critical to describe the long-term implications associated with deferring maintenance and repair when compared to other competing demands for capital improvement and protection.

It is important to note that there are critics of USACE’s processes, and there have been numerous independent reviews of the USACE Civil Works processes and strategies. In 2004 the National Academies conducted one of the more recent reviews in which it acknowledged the challenges of resolving competing interests in water resources infrastructure planning.²⁶

Department of Transportation Initiatives

The U.S. Department of Transportation (DOT) also oversees a significant amount of federal infrastructure including roads, bridges and highways; mass transit; rail; and aviation. The DOT includes the following agencies that are responsible for their respective transportation infrastructure sectors: Federal Aviation Administration, Federal Highway Administration (FHWA), Federal Railroad Administration, and Federal Transit Administration. As a general

observation, DOT, like USACE, has also implemented several significant improvements within its sector. Many of these improvements are similar and can be applied at the national level to better integrate efforts across the sectors.

Most critically, the DOT also has a strategic plan that can be characterized as an overarching strategy that articulates ends, ways, and means. The DOT plan first identifies the following strategic objectives: safety, mobility, global connectivity, environmental stewardship, and security.²⁷ The plan then further defines supporting goals and nested outcomes. These goals and outcomes provide essential direction as DOT agencies attempt to effectively balance various demands; they also provide a framework to facilitate prioritization. Just as for USACE, the articulation of overarching and supporting objectives is a critical step in developing an effective infrastructure strategy; the DOT Strategic Plan also does this well.

The DOT plan also specifies a series of ways or concepts to accomplish the strategic objectives and nested outcomes. These include the following: leadership, building expertise, technology, and emphasis on cross-cutting programs designed to “address challenges, to leverage resources and to share expertise.”²⁸ When compared to USACE’s methods, there are several similarities in the details of these broad approaches. First, the FHWA also stresses collaboration and partnerships as a key method to achieve its overarching goals:

FHWA will be an advocate and convener to promote intermodal, interstate, national and international, public and private sector, as well as local and regional, perspectives....We will bring together diverse stakeholders to ensure compatibility between transportation goals and other national and local goals....We will seek to improve public and intergovernmental coordination through enhanced cooperative agreements and improved management practices.²⁹

In addition, the FHWA emphasizes a systems approach which recognizes the interrelated nature of transportation infrastructure:

Improving the operation of the highway system and its intermodal linkages support the mobility, productivity and safety goals. FHWA initiatives to identify and share effective management systems and practices that address congestion, safety, incident management, work zone traffic control, and other operational issues, will result in improved highway operations.³⁰

In addressing the challenges with traffic congestion, the FHWA uses a regional approach in coordination with the collaborative approach described above:

When applying these strategies [to address congestion], agencies need to think and act regionally about solutions to congestion problems. In fact, FHWA is promoting the concept of regional partnerships as a means to implementing effective operations. These partnerships provide a platform for interagency coordination and joint delivery of operations-based services.³¹

The DOT is also working diligently to link resources to outcomes through the performance based budgeting process. The DOT Performance Plan operationalizes the Strategic Plan and provides linkages to the budget request; it defines performance goals, quantifiable measures, and specific performance targets that are used to make progress towards their strategic objectives.³² Non-federal cost sharing continues to be key aspect of the DOT resourcing strategy. To summarize, the DOT and its subordinate agencies, like USACE, are using a variety of similar ways to accomplish their overarching goals.

Recommended Improvements

The following recommendations focus primarily on improving cross-sector integration and synchronization. They are based largely upon the recent experiences of USACE and DOT within their respective sectors. The most essential and critical aspect of these recommended improvements is the creation of an integrating strategy and process at the national level. An overarching national infrastructure strategy is required which articulates and balances ends, ways, and means to improve risk assessment and prioritization across the various sectors.

Begin with an Executive Order. The recommended changes would be outlined in an Executive Order. By beginning with a Presidential mandate, an immediate sense of urgency is created which can overcome any potential interdepartmental inertia. It also reduces the likelihood that the impetus to initiate and implement positive change will be personality dependent. The strategy would include several key components. First and critically, it would establish and articulate the “grand” goal of ensuring that our nation maintains a robust and effective physical infrastructure system. This end would establish and highlight the criticality of our nation’s infrastructure and the imperative for a long-view (i.e., the need to identify goals and broad outcomes over the next ten to fifteen years). This vision is especially critical, and it would stress the need for improved integration across the federal sectors providing infrastructure. The strategy is ultimately intended to contribute to informed decision making by effectively articulating the implications and tradeoffs of various policy decisions.

Long Range Planning. As mandated by GPRA, both USACE and DOT are developing longer-range strategic plans which provide for improved integration within their sectors. While these efforts are positive and will lead to improved performance within sectors, improved integration across sectors is required. In other words, GPRA (and other related initiatives, i.e., PMA) are necessary but not sufficient components of an effective national infrastructure strategy.

Establish a Federal Oversight Mechanism. A critical component of the Executive Order would be the establishment of a federal oversight structure required to implement an improved strategy. The broad intent here is not to create a separate agency; instead, a national “infrastructure czar” would be designated to further refine the details of the optimal “way ahead” from the broad vision outlined in the Executive Order. A small staff would be recommended for this official, and again, the primary role of this office would be to integrate and build upon existing structures to improve integration and synchronization against developed ends and goals. This function would broadly replicate and implement USACE’s and DOT’s efforts at collaboration, partnership, and interagency cooperation at the national level.

The primary means for improving interagency coordination would be an advisory council. The National Infrastructure Advisory Council (NIAC) offers a possible model. Executive Order 13231 outlined the duties of the NIAC: it “shall provide the President through the Secretary of Homeland Security with advice on the security of the critical infrastructure sectors and their information systems.”³³ While the NIAC is focused primarily on the protection component of an infrastructure strategy, a strength of the NIAC is in its composition: it includes public and private sectors, and representation from federal, state, and local government.³⁴ A similar advisory structure should be used for these ends, and the “infrastructure czar” should oversee its development.

Validate Requirements. After establishing the criticality of the issue, a long-term vision, and an oversight and integrating structure, the next aspect in the strategy should focus on the need to effectively see and assess the “big picture” so that more detailed ends, ways, means can be developed. Both USACE and DOT use a variety of methods (including performance based budgeting) to accomplish this. Clearly, this is an iterative process that requires recurring assessments and corresponding adjustments to the ends, ways, and means articulated in a flexible strategy that would be issued at least once in each administration’s four-year tenure. In order to facilitate this, the Executive Order would require that the OMB, in coordination with the appropriate federal agencies, develop a recurring status report providing the assessment of the estimated investment required for achieving the stated goals. It would also investigate means to develop more consistent estimates of requirements across the federal sectors. This process would effectively confirm or deny the ASCE “report card” to objectively assess the nature of the challenges ahead. This assessment would allow for the development of more specific ends as well as prioritization. For example, if the assessment validated that the transportation sector was expected to continue to present challenges over the long-term, then improving our transportation infrastructure would be established as a national goal and prioritized accordingly.

Within the current system, transportation infrastructure (and roads and highway in particular) has received emphasis; however, this prioritization is not necessarily within the context of an integrated approach that objectively evaluates the requirements of the other sectors (i.e., mass transit, inland waterway navigation, etc.).

Leverage Lessons Learned. A key charter of the advisory council would be to identify and investigate efficiencies and innovations within the various sectors that could be exported to the national strategy. Ideally, the council would leverage the various improvements within the sectors across the sectors to improve overall national performance. An analysis of the recent experiences of USACE and DOT in their respective infrastructure sectors illustrates several possibilities. Both USACE and DOT are emphasizing collaboration, a regional approach, performance based budgeting, and a systems approach. At the federal level, we need a similar framework which applies a systems approach across the sectors to better integrate efforts towards national goals. This would lead to improved integration, synchronization, and performance at the national level.

These methods facilitate the improved use of federal resources. For example, federal cost-sharing formulas in both DOT and USACE have evolved over time, and they are different. A key lesson learned is that local matching requirements promote effective use of federal monies. As a way of linking means to ends, the advisory council would compare and evaluate these cost-sharing formulas across the sectors to ensure they were promoting and aligned with national priorities. The council would then offer recommendations for adjustments to cost sharing formulas as appropriate.

Another example of an innovation that could be applied across sectors is USACE's planning process in which a reconnaissance study is conducted to determine if a federal interest exists in a given project. In this case, the advisory council could investigate whether this approach could be applied to other sectors. The council could also investigate and leverage independent review on proposed infrastructure programs that are likely to be the most contentious and resource intensive.

Reinforce the PMA and GPRA. The charter of the council would also reinforce the mandates required by the PMA and GPRA. Specifically, it would monitor and share innovative efforts to institute performance based budgeting within the sectors. The council could synchronize performance based budgeting across the sectors so that program spending is aligned with national priorities and goals. The council would also identify appropriate metrics to assess its performance.

Feasibility, Acceptability, and Suitability

The means (resources) to execute the concepts outlined above are available; accordingly, the strategy is feasible. In fact, the strategy proposes and facilitates improved effectiveness in using our federal resources to accomplish our national infrastructure goals. Most importantly, the proposed strategy would result in clearly articulated national goals and priorities regarding infrastructure. There are some challenges with acceptability. Specifically, the recommended strategy requires Presidential and Congressional support and leadership. It must be noted that previous efforts have gained little traction. To illustrate, consider the following:

The Public Works Improvement Act of 1984 established a short-lived Council on Public Works Improvement for the purpose of preparing reports for the President and Congress on the state of the nation's infrastructure....These reports reinforced concerns regarding the inadequacy of America's infrastructure, but neither the reports nor the Council provided a strategic infrastructure plan for the country.³⁵

The proposed strategy would emphasize a long-term view that will likely outlive many elected officials' tenure in Washington, D.C. However, by emphasizing improved effectiveness and efficiency with federal resources, Executive Branch support can be reasonably expected. Additionally, the recommended changes would complement the ongoing initiatives outlined in the PMA. While legislative resistance to any attempts to minimize "earmarks" is possible, the larger focus and associated benefit should satisfactorily temper and mitigate these concerns. Furthermore, the current fiscal environment and increasing public and political recognition of symptoms of larger problems provide the necessary impetus to overcome the inertia of the status quo.

There are some challenges with "suitability"-- the question of whether or not the proposed strategy will work. Given the scope and complexity of the issue, there are challenges with strategy implementation, most notably surrounding the effectiveness of a newly designated "infrastructure czar" and advisory council and its associated interagency efforts. Again, this can be overcome with leadership and commitment to the larger goals. While the recommended strategy has some challenges with implementation, it will result in significantly reduced risks, and it offers suggested first steps in addressing a broad, multifaceted issue.

Conclusion

While the various federal agencies involved in providing infrastructure are working diligently within their sectors to articulate individual strategies, we do not have an integrated national infrastructure strategy that effectively balances ends, ways, and means across the various sectors. This creates significant and unknown levels of risk which can adversely affect

our economic and national security. The recommended improvements offer a cost-effective means to promote explicit debate about our nation's long-term strategy for infrastructure. While there will always be challenges with such a broad issue, the recommended strategy is feasible, acceptable, and suitable. Most critically, it will improve integration across the sectors and offers a more systemic means to assess the scope of the issue and adjust the strategy as required. This, in turn, will reduce the risk associated with the current approach. As the challenges are complex, they require a coordinated intergovernmental approach. The proposed strategy will facilitate this approach. Our current approach to infrastructure recently saw the United States characterized as a "Fixer-Upper Nation," with a warning that if we continue to ignore that "drip, drip, drip" in the upstairs bathroom, we are pretty soon going to be pricing a new ceiling.³⁶ This analogy captures the implications of our current infrastructure process very well, and we should move quickly to implement the proposed strategy improvements.

Endnotes

¹Alan Elsner, "U.S. Infrastructure Deteriorating, Report Finds," 9 March 2005; available from http://www.ci.akron.oh.us/News_Releases/2005/0310.html; Internet; accessed 30 November 2005.

²American Society of Civil Engineers (ASCE), "Report Card for America's Infrastructure," available from <http://www.asce.org/reportcard/2005/page.cfm?id=103>; Internet; accessed 10 November 2005.

³Ibid.

⁴American Public Works Association (APWA), "Facts About America's Public Infrastructure," available from <http://www.apwa.net/advocacy/infrastructure/>; Internet; accessed 10 November 2005.

⁵ASCE.

⁶The National Academies, "Measuring and Improving Infrastructure Performance (1996)," available from <http://www.nap.edu/openbook/0309050987/html/1.html>; Internet; accessed 2 December 2005.

⁷U.S. Congress, Senate, Committee on the Environment and Public Works, Subcommittee on Transportation and Infrastructure, *U.S. Infrastructure, Funding Trends and Federal Agencies' Investment Estimates, Statement of Peter F. Guerrero, Director, Physical Infrastructure Issues*, GAO, 107th Cong., 1st sess., 23 July 2001, 5.

⁸Infrastructure Canada, "U.S. Infrastructure Policies and Programs: An Overview," June 2003; available from http://www.infrastructure.gc.ca/researchrecherche/rresul/rs/documents/rs01_e.pdf; Internet; accessed 16 February 2006.

⁹The National Academies.

¹⁰U.S. Congress, Senate, Committee on the Environment and Public Works, Subcommittee on Transportation and Infrastructure, 14-15.

¹¹Infrastructure Canada.

¹²Ibid.

¹³Bret Schulte, "A Bridge (Way) Too Far; A Controversial Alaska Project Highlights the Pork-Barrel Politics Of Transportation Funding By Congress," *U.S. News & World Report* (8 August 2005): 26 [database on-line]; available from ProQuest; accessed 2 December 2005.

¹⁴U.S. Congress, House of Representatives, Government Reform Subcommittee on Government Efficiency, Financial Management and Intergovernmental Relations, Rules Subcommittee on Legislative and Budget Processes, *Performance Budgeting, Opportunities and Challenges, Statement of David M. Walker, Comptroller General, 107th Cong., 2d sess.*, 19 September 2002, 1.

¹⁵Ibid.

¹⁶U.S. Army Corps of Engineers, "Civil Works Strategic Plan, Fiscal Year 2004 - Fiscal Year 2009," March 2004, available from http://www.usace.army.mil/inet/functions/cw/hot_topics/cw_strat.pdf; Internet; accessed 1 November 2005.

¹⁷Ibid.

¹⁸Ibid., 7.

¹⁹Ibid., 6.

²⁰Ibid., 7.

²¹The National Academies, "Analytical Methods and Approaches for Water Resources Project Planning (2004)," available from <http://www.nap.edu/books/0309091829/html/117.html>; Internet; accessed 1 November 2005.

²²Ibid., 112.

²³U.S. Army Corps of Engineers, "Independent Review," available from http://www.usace.army.mil/inet/functions/cw/hot_topics/independentreview.htm; Internet; accessed 8 November 2005.

²⁴U.S. Army Corps of Engineers, "Chief of Engineers Recommends Ecosystem Restoration and Navigation Improvements for Upper Mississippi River and Illinois Waterway," available from http://www.usace.army.mil/inet/functions/cw/hot_topics/16dec_ecosystem.htm; Internet; accessed 19 November 2005.

²⁵U.S. Army Corps of Engineers, "Civil Works Budget Press Conference, 7 February 2005," available from <http://www.hq.usace.army.mil/cepa/releases/2006transcript.htm>; Internet; accessed 17 November 2005.

²⁶The National Academies, 86.

²⁷U.S. Department of Transportation, "Strategic Plan, 2003-2008," available from http://www.dot.gov/stratplan2008/strategic_plan.htm#_Toc52257032; Internet; accessed 12 November 2005.

²⁸Ibid.

²⁹U.S. Federal Highway Administration, "National Strategic Plan," available from <http://www.fhwa.dot.gov/policy/fhplan.html>; Internet; accessed 15 November 2005.

³⁰Ibid.

³¹U.S. Federal Highway Administration, "Traffic Congestion and Reliability: Linking Solutions to Problems," available from http://ops.fhwa.dot.gov/congestion_report_04/executive_summary.htm; Internet; accessed 10 November 2005.

³²U.S. Department of Transportation, "DOT Performance Plan," available from http://www.dot.gov/PerfPlan2004/intro_perfplan.html; Internet; accessed 20 November 2005.

³³U.S. President, "Executive Order, Continuation of Certain Federal Advisory Committees and Amendments to and Revocation of Other Executive Orders," available from <http://www.whitehouse.gov/news/releases/2005/09/20050930-5.html>; Internet; accessed 30 November 2005.

³⁴Ibid.

³⁵Infrastructure Canada.

³⁶Eugene Robinson, "Fixer-Upper Nation," *The Washington Post* (22 July): [database on-line]; available from ProQuest; accessed 29 November 2005.